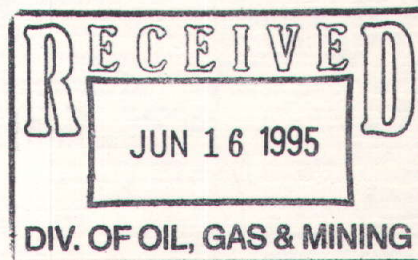


m/053/005

# USMX



Mr. Wayne Hedberg  
State of Utah  
Department of Natural Resources  
Division of Oil, Gas and Mining  
355 West North Temple  
Salt Lake City, UT 84180-1203

Mr. Hedberg,

Enclosed is a summary report of the solution release at the USMX Goldstrike Mine which occurred in March of this year. We feel that in reviewing the document you will agree with us that there was no threat to the environment as a result of this action. Should you have any questions please feel free to call me at (801) 574-3269.

Sincerely;

A handwritten signature in cursive script, appearing to read "Robert K. Wilson".

Robert Wilson  
Environmental Coordinator

USMX of Utah, Inc. Goldstrike Mine  
Summary of Discharge Events During March 1995.

May 8, 1995  
Prepared by: Robert Wilson  
Environmental Coordinator, Goldstrike Mine

## SUMMARY

USMX of Utah, Inc. owns and operates the Goldstrike mine which is located 35 miles northwest of St. George, Utah. The mine which was built, and previously owned, by Tenneco Minerals Co. and was purchased by USMX in 1993. Open pit mining has been used to remove the ore from the pits and a cyanidation heap leach process is used to recover the gold from the ore. Mining at Goldstrike ended in October of 1994 when all currently permitted economic reserves were mined out. USMX is in the initial stages of facilities closure at this time. Reclamation work of the mining areas at Goldstrike has been essentially completed. Current and future activities will focus on recovery of the remaining gold from the leach pads and neutralization and reclamation of the leach pads and process facilities.

Initial mine and facilities construction began in 1988. Following this initial construction, additional pits, roads, leach pads and ponds were constructed in stages as additional reserves were located and facilities were permitted. Of primary concern during the design, permitting and construction of the fluid management system was the capability of the system to withstand extraordinary precipitation events. Construction of each phase of the project took place only after all designs and procedures had been thoroughly reviewed by the state and federal regulatory agencies to ensure an environmentally sound operation.

Nearly 8 million tons of ore were mined, hauled and processed during the 7 year life of the mining operations. During this time the Goldstrike management has made every effort to comply with all environmental regulations to the best of their ability. Continued operations and expansions of the mine would not have been possible if this were not the case.

Precipitation over the period November 1, 1994 through March 24, 1995 totaled 21.25 inches (nearly twice the 12 to 13 inch annual precipitation for the area). Precipitation impacting the mine after January 1, 1995, totaling 16.29 inches, was also in exceedence of the average annual precipitation for the area. The culminating precipitation event was a 3.70 inch storm, (which is in excess of the calculated 100-year, 24-hour precipitation event of 3.4 inches), which occurred on March 11, 1995. Despite extraordinary efforts by USMX to dispose of water by evaporation and to maximize storage in the heaps, the accumulation of water from this storm and previous storms exceeded the storage capacity of the fluid management system. As a result it was necessary to treat and release process solution from the fluid management system. The release of treated solution from the mine site was initiated following notification of the Utah Division of Water Quality (DWQ) on March 11, 1995 at 1:30 pm, and continued until March 15, 1995. During this time period a total of 6,664,000 gallons of treated solution were released. The treated solution was released from the Hamburg Pond, via a siphon pipe, into the Quail Drainage, which empties into Arsenic Gulch, and from the recycle pond, via a pipeline, into Arsenic Gulch, which is a tributary of the East Fork of the Beaver Dam Wash, all of which are normally dry washes.

USMX, as a precautionary measure, had stopped adding cyanide to the leach circuit in November of 1994. As a result of this action, the cyanide strength within the leach circuit

was below drinking water standards when tested by on site equipment. This loss of cyanide was due to both dilution and normal degradation. Because of these low levels, treatment for cyanide was not required. This allowed the company to concentrate on the removal of other constituents contained in the solution which may have been considered detrimental.

Sampling was conducted prior to the release from locations at the mouth of Arsenic Gulch and on the East Fork of the Beaver Dam Wash (EFBDW), both below and above the confluence of Arsenic Gulch with the wash. Additional daily sampling was conducted from the discharge flow at the end of the pipes, the EFBDW above and below the confluence of Arsenic Gulch and an additional sample point further downstream in the EFBDW, for the duration of the release and one additional day following the release. Sampling was also conducted by personnel of DWQ on March 12, 1995, and of the Fish and Wildlife Service on March 23, 1995.

#### GOLDSTRIKE MINE -- LOCATION, ACCESS, GEOGRAPHY, CLIMATE

USMX of Utah, Inc. operates the Goldstrike Mine which is an open pit gold mine and cyanide heap leach facility in the Goldstrike Mining District of the Bull Valley Mountains in Northwest Washington County, Utah. The project is located 38 miles Northwest of St. George, Utah, in Sections 16, 17, 20 and 21 of T39S, R18W Salt Lake Base and Meridian.

Access to the site is via 15 miles of paved road from St. George to the junction of Motoqua Road, then Northwest on the gravel Motoqua Road No. 42529 for a distance of 15 miles to the D.I. Ranch road junction, then 8 miles northeast to the mine site.

The project infrastructure consists of several open pits which have been backfilled, and waste rock dumps which have been reclaimed, heap leach pads, solution ponds, a carbon processing facility, and offices.

Significant geographic relief consisting of rolling hills and mountainous terrain is present at the site. The pits, pads, and process facilities have all been adapted to the natural terrain while maintaining the necessary elevation gradients for solution flow and collection.

The site is located at an elevation of approximately 5300 feet above sea level. Summers are hot with temperatures up to 100°F or higher. Winter temperatures can be sub-zero and snow storms are common. Average annual precipitation is roughly 12 inches, most of which falls between December and April, inclusive.

#### FLUID MANAGEMENT SYSTEM, CONCEPT AND DESIGN

The fluid management system is the key to containing and controlling process solution and water from rainfall and snowfall events. The facility is located in a region of negative water balance, meaning that there is more net evaporation than precipitation on an annual basis. The fluid management system is called a "zero discharge system" or "closed system" because it was designed for the climate exhibited in this region to contain and control all normal

operational process solution, plus the total amount of precipitation from a 100 year- 24 hour storm event.

Total pond capacity of the original fluid management system was 4.3 million gallons, plus 0.6 million gallons of fresh water storage capacity. After the precipitation event in Spring, 1991, it was decided to increase the total capacity by adding an additional 3 million gallon rinse water pond at the foot of Leach Pad #1. In 1993 after the purchase of the mine by USMX, an additional 5 million gallon pond was added. This increased the total volumetric capacity of the fluid management system to 12.9 million gallons. Total "fall-on" surface area of the leach pads and ponds is 55.6 acres or 2,421,900 square feet. Calculations indicate that delivery of one inch of precipitation onto the surface of the fluid management system captures 1,509,673 gallons of solution.

Cyanide concentration maintained in the fluid management system differs at various points throughout the operation. Under normal operations, leach solution applied to the top of the heaps usually contains about 200 mg/l free cyanide. By the time this leach solution has returned to the pregnant solution pond the cyanide concentration is approximately 100 mg/l free CN.

USMX is in the final stages of operation and reclamation at these facilities and has not been using normal concentrations of cyanide in the leach circuit. As mentioned previously, cyanide has not been added to the circuit since November 1, 1994. Future cyanide concentrations will be limited to about 35 mg/l and ultimately reduced to drinking water standards.

#### EMERGENCY TREATMENT FACILITIES

On-site capability to treat spills and discharges by destroying cyanide in solution is required by permit. Calcium Hypochlorite in quantities sufficient to treat relatively small spills is maintained at the facility for such events. In addition to maintaining a stock of calcium hypochlorite on site, management maintains treatment equipment and neutralizing chemicals to deal with emergency spills. Because of natural degradation of the cyanide and dilution from the accumulated storm waters it was not necessary to use the facilities to destroy cyanide during the March 1995 discharge. This is advantageous as chlorides used to destroy cyanide can also themselves be an undesirable water constituent. It is not anticipated that, at the rates which USMX proposes to add cyanide, a future similar occurrence would require treatment for cyanide. In the event such an emergency were to occur, all facilities and supplies are in place that would be needed to adequately neutralize all cyanide which would be of concern.

Current facilities used to treat solution in emergencies consist of a chlorine gas addition unit, a mixing tank for addition of lime, and a solution circulation and discharge pump. Treatment begins upon commencement of filling a 600,000 gallon retention pond. Solution is pumped into the pond at a rate of 1,000 gallons per minute. Chlorine introduced from manifolded chlorine cylinders passes through two eductors. Slurried lime is mixed with the

chlorinated solution in the pond forming hypochlorite which is a strong oxidizer that quickly and thoroughly neutralizes cyanide. Solution is treated in batches to insure that the cyanide is neutralized before release. After sample analysis has been performed to determine that cyanide neutralization is complete, the solution is aerated to reduce residual chlorine content. The treated solution is then pumped out of the pond to Arsenic Gulch where aeration of flow along the rocky wash further reduces free cyanide and chlorine content.

#### ENVIRONMENTAL REGULATION AND COMPLIANCE

Since the beginning of the project all necessary permits required to operate the mine have been obtained from the agencies listed below:

U.S. Bureau of Land Management  
Utah Division of Oil, Gas, and Mining  
Utah Division of Water Quality  
Utah Division of Air Quality  
Utah Southwest District Health Department

Monthly and quarterly reports are submitted to these various agencies as a matter of permit compliance. Results of monitoring and/or sampling several areas of interest are presented in these reports. Results from water samples taken both upgradient and downgradient from the mine site are submitted regularly. Slight pad movements due to natural slumping are detected by inclinometers and reported on a regular basis. Total tonnages mined, hauled and delivered to the pad, overall fuel consumption, and the total number of blast holes drilled daily were reported during the time mining was in progress.

All permits are written such that if monitored or sampled results are not within the specified bounds of the permit, it becomes mandatory to either include the results of the monitoring or sampling in the next report, or to immediately notify the appropriate agency depending upon the situation. This system guarantees that mine management and the various agencies keep abreast of situations as they develop and work together in defining the appropriate action to be taken.

#### PRECIPITATION AND DISCHARGE EVENT

Between November 1, 1994, and March 31, 1995, a total of 21.25 inches of precipitation was received at the mine site. At the onset of this period there was a cumulative total of 1.3 million gallons of solution contained in the ponds at Goldstrike. Although USMX had taken extraordinary measures to evaporate excess water accumulated from these storms and to store as much water as possible in the vadose reservoirs of the leach pads, a release of treated solution was necessary. No measurable environmental effects occurred from the release due to preparations which the mine management had undertaken in relation to the extremely wet winter. The precipitation history leading up to the solution release is as follows:

DATE	RAINFALL INCHES	
11/2/94	.26	
11/3/94	.15	
11/10/94	.18	
11/11/94	.29	
11/12/94	.78	
11/13/94	.07	
11/16/94	.04	
11/17/94	.02	
11/18/94	1.05	
11/26/94	.22	3.06 TOTAL FOR MONTH
12/07/94	.12	
12/13/94	.18	
12/24/94	.70	
12/25/94	.79	
12/28/94	.02	
12/29/94	.09	1.90 TOTAL FOR MONTH
01/03/95	.22	
01/04/95	.40	
01/05/95	.56	
01/07/95	.29	
01/08/95	.13	
01/09/95	.07	
01/10/95	.80	
01/11/95	.56	
01/15/95	.30	
01/16/95	.14	
01/21/95	.09	
01/23/95	.15	
01/24/95	.45	
01/25/95	1.01	
01/26/95	.60	
01/27/95	.03	5.80 TOTAL FOR MONTH
02/13/95	.30	
02/14/95	3.05	
02/27/95	.13	
02/28/95	.03	3.51 TOTAL FOR MONTH

DATE	RAINFALL INCHES	
11/2/94	.26	
11/3/94	.15	
11/10/94	.18	
11/11/94	.29	
11/12/94	.78	
11/13/94	.07	
11/16/94	.04	
11/17/94	.02	
11/18/94	1.05	
11/26/94	.22	3.06 TOTAL FOR MONTH
12/07/94	.12	
12/13/94	.18	
12/24/94	.70	
12/25/94	.79	
12/28/94	.02	
12/29/94	.09	1.90 TOTAL FOR MONTH
01/03/95	.22	
01/04/95	.40	
01/05/95	.56	
01/07/95	.29	
01/08/95	.13	
01/09/95	.07	
01/10/95	.80	
01/11/95	.56	
01/15/95	.30	
01/16/95	.14	
01/21/95	.09	
01/23/95	.15	
01/24/95	.45	
01/25/95	1.01	
01/26/95	.60	
01/27/95	.03	5.80 TOTAL FOR MONTH
02/13/95	.30	
02/14/95	3.05	
02/27/95	.13	
02/28/95	.03	3.51 TOTAL FOR MONTH

03/01/95	.70
03/02/95	.12
03/03/95	.22
03/05/95	1.15
03/06/95	.01
03/10/95	.19
03/11/95	3.70
03/12/95	.07
03/21/95	.18
03/23/95	.62
03/24/95	.02

6.98 TOTAL MONTH TO DATE

21.25 INCHES SINCE NOV. 1 1994

The site process facilities consist of two leach pads, a processing plant and associated storage ponds. The leach system is designed as a total containment system with the leach pads and ponds being underlain with a high density polyethylene plastic liner. Storage ponds located in the processing area are: a pregnant solution pond, a barren solution pond, a recycle pond and a fresh water pond. In addition to these ponds is a rinse water pond located near leach pad # 1 and a fresh water / emergency pond located in the Hamburg pit area known as the Hamburg pond. Total capacities for each of these ponds are as follows;

<u>POND</u>	<u>CAPACITY</u>
Pregnant pond	973,000
Barren pond	1,060,000
Recycle pond	2,400,000
Fresh Water pond	600,000
Rinse Water pond	2,900,000
<u>Hamburg pond</u>	<u>5,000,000</u>
Totals	12,933,000

The pond system at Goldstrike was initially designed and permitted to withstand and contain a 100 year - 24 hour rainfall event in addition to normal operational process solution volumes. Because of past experience Tenneco constructed the Rinse Water pond near Leach Pad 1, and USMX, following purchase of the mine, built the Hamburg pond to add additional storage capacity above and beyond that which was required by design.

#### CIRCUMSTANCES LEADING TO RELEASE AND SUMMARY OF USMX EFFORTS TO MINIMIZE THE IMPACT OF THE RELEASE

On March 10, 1995, prior to the beginning of the 100-year storm event, total solution in all ponds totalled 10.1 million gallons (total pond capacity is 12.33 million gallons, excluding the capacity of the 600,000 gallon fresh water pond). Of the contained solution, 8.8 million gallons had accumulated since November 1, 1994, due directly to storm water additions.

Precipitation began falling at approximately 8:00 PM on March 10. By 9:00 AM the next morning approximately 1.5 inches had fallen and weather forecasters told USMX that perhaps an additional three inches of rain could be expected from the current storm. In light of the volume of process solution in inventory and the amount of additional precipitation anticipated, USMX determined that it was necessary to commence a controlled discharge of treated process solution in order to prevent an uncontrolled release of process solutions directly from the facility ponds. A direct discharge from the ponds not only would have the possibility of compromising the pond embankments but also would preclude the ability to treat the discharge solution.

Prior to release of solution, USMX had succeeded in reducing the free cyanide concentrations in the Hamburg and recycle ponds to levels below the detection limits of on-site testing equipment (0.02 mg/l). This reduction in cyanide concentrations resulted from a planned series of actions on the part of USMX which commenced in November 1994. These actions are summarized below:

- 1) Addition of cyanide to barren solutions was stopped on November 1, 1994.
- 2) Thereafter, cyanide consumption in the heaps and dilution due to precipitation resulted in substantial reduction in cyanide concentrations in process solutions.
- 3) Chemical treatment of process solutions to further reduce cyanide and concentrations of certain metals began in advance of solution transfer to the Hamburg pit pond.

Beginning on December 29, surface runoff water from pad #1 reporting to the recycle pond was pumped to the Hamburg pit pond. This continued intermittently through January 19. Thereafter, water pumped from the recycle pond to the Hamburg pit pond included a small percentage of barren solution which was added to the recycle pond by way of the barren pond overflow pipe. Process solutions from the recycle pond that were pumped to the Hamburg pit pond were treated with alkaline chlorination prior to transfer to the Hamburg pit pond. Free cyanide analyses from the Hamburg pit pond which were performed on site at USMX's laboratory ranged from 0.14 mg/l free cyanide on January 11 to non-detectable after January 30, 1995. These results demonstrate that treatment efforts for cyanide were successful.

In addition, water entering the recycle pond after approximately January 10, 1995 was treated with ferric sulfate at the rate of 50 pounds/100,000 gallons of water to reduce arsenic concentrations. Further treatment consisted of the addition of sodium sulfide to both the Hamburg pit pond and the recycle pond to reduce mercury concentrations in water stored in these ponds prior to release.

#### DETAILS OF DISCHARGE ACTIONS, INCLUDING QUANTITY AND QUALITY OF TREATED SOLUTION RELEASED

As the result of the excess precipitation water in the solution management system, USMX commenced release of treated process solution from the Hamburg pit pond at approximately 1:30 PM on March 11, 1995 and from the recycle pond at 11:30 AM on March 12, 1995.

Solution release ceased from these ponds at 12:30 AM on March 14, 1995 and 8:00 AM on March 15, 1995, respectively. During these time periods, approximately 3,898,000 gallons of treated process solution were released from the Hamburg pond and 2,466,000 gallons of treated process solution were released from the recycle pond. In addition, 300,000 gallons of water (a mixture of treated process solution and rainwater) were released from the fresh water pond on March 11, 1995 in anticipation of increasing levels of process solution in the ponds as the result of ongoing heavy rainfall and resultant pad drainage. The total volume of treated process solution released was approximately 6,664,000 gallons.

Treated process solution was released from the recycle and fresh water ponds via pumping through the 6-inch Hamburg/Arsenic Gulch siphon pipe (AG Pipe). This pipe discharged to the mouth of Arsenic Gulch approximately 50 feet above the confluence with the East Fork of Beaver Dam Wash. This enabled the treated solution to immediately mix with the water in the East Fork of Beaver Dam Wash, which was flowing at high volume during the entire period of the release.

Treated process solution in the Hamburg pit pond was released by way of two different pathways: a 6-inch siphon line from the pond to the AG pipe and then to the discharge point of the AG line at the mouth of Arsenic Gulch; and, an 8-inch siphon line (the HB pipe) and portable pumps from the pond to the Quail Creek drainage then to Arsenic Gulch. Approximately 612,000 gallons were released via the AG Pipe. Of the 3,286,000 gallons released to the Quail Creek drainage, approximately 2,134,000 gallons were released via the siphon line during the entire period of release. The other approximately 1,152,000 gallons were released by pumping during the period from 8:00 PM on March 11 through 8:00 PM on March 12. Therefore, during the first 30 hours of discharge, the release to the Quail Creek Drainage was approximately 2,320,000 gallons or 68 percent of the treated solution released from the Hamburg pond.

At the time that treated solution release from the Hamburg pit pond ceased early in the morning of March 14, 1995, approximately 1,300,000 gallons remained in the Hamburg pit pond. Discharge was not continued thereafter because the water level in the pond was low enough that cavitation occurred in the siphon pipe causing a loss of siphon. The intake of the gas pumps had the same problem, therefore to avoid the possibility of compromising the flexible membrane pond liner, a pump was not placed inside the pond.

During the period of the solution release, flow rates in both the receiving reach of Quail Creek and in East Fork Beaver Dam Wash were at their highest. The following table summarizes flow observations made by USMX staff for the East Fork of Beaver Dam Wash prior to and during the period of release.

Summary of Observed Flow Rates in East Fork of Beaver Dam Wash 12/13/94 to 3/15/95					
Date	Flow (cfs*)	Date	Flow (cfs*)	Date	Flow (cfs*)
12/13/94	0.1	2/14/95	440	3/12/95**	430
12/29/94	2.2	2/16/95	300	3/14/95**	100
1/12/95	30	3/2/95	27	3/15/95**	100
1/30/95	70	3/11/95**	300		

\* cubic feet per second

\*\* denotes day during which treated solutions were being released

Flows in Arsenic Gulch during the first two days of the release were estimated by Goldstrike personnel to have been up to 60 to 80 cfs on March 12, 1995. Flow rates in this drainage were observed to be substantially less than, but generally proportional to, those in East Fork Beaver Dam Wash throughout the release period.

Samples were taken for independent laboratory analysis from each discharge pipe daily during the discharge. Samples were analyzed by Chemtech Analytical Laboratories of Salt Lake City. The discharge water quality is summarized in Table A-1 in Attachment A. In addition, the free cyanide content of the ponds from which discharge occurred (recycle pond and Hamburg pit pond) was measured using USMX's on-site laboratory using a HACH colorimetric cyanide analyzer. The following table summarizes free cyanide analyses of pond and discharge water during the period that treated process solutions were being released. Free cyanide data from the ponds represent the average of readings taken with the HACH unit. Data from the AG pipe, which had flows from both the Hamburg pit and recycle ponds, is from Chemtech.

Results of Free Cyanide Analyses from Hamburg Pit and Recycle Ponds and AP Pipe					
Location	Analytical Results for Release Period (mg/l)				
	3/11/95	3/12/95	3/13/95	3/14/95	3/15/95
Hamburg Pit Pond*	no analysis	0.02	0.02	no analysis	no analysis
Recycle Pond*	0.01	0.07	0.09	0.04	no analysis
AG Pipe**	0.20***	0.51***	<0.01	0.778***	0.637***

\* On-site HACH analyses; results are average of daily all measurements

\*\* Chemtech analytical results

\*\*\* Possible matrix interference noted by Chemtech

Chemtech notes possible matrix interference for all free cyanide analyses except for the 3/13/95 sample. Matrix interference is caused by other dissolved components interfering with the free cyanide measurement in the laboratory sample. According to Chemtech, no methods for free cyanide analysis exist that are not susceptible to such interferences. The use of additional chemicals to treat mercury and arsenic may have contributed to the observed matrix interference at Chemtech. USMX's colorimetric analyzer apparently was immune to these interferences. There is better correlation between the AG Pipe (Chemtech) analyses and the pond (HACH) analyses for the March 13 samples in which Chemtech does not cite possible matrix interference.

The HACH free cyanide analyses indicate that the Utah Ground Water Quality Standard for Free Cyanide (also the drinking water MCL) was not exceeded during the discharge. It is USMX's experience that in the past a good correlation between its on-site HACH measurements and Chemtech's laboratory analyses of free cyanide was found.

Samples from the AG pipe and the HB pipe represent the treated solutions as released prior to any mixing with flood waters. Table A-1 also summarizes the results of Chemtech analyses of the AG pipe and HB pipe samples for other key analytes as well as drinking water MCLs/Utah ground water quality standards for each analyte. In addition to free cyanide results, the following describe the comparison of the analytical results to primary MCLs 1) nitrate consistently exceeded the MCL by a significant amount (though not shown on Table A-1, nitrite also exceeded the ground water standard on all days); 2) ph exceeded the recommended range on the last two of five discharge days; 3) arsenic concentrations slightly exceeded the MCL on two of five discharge days; 4) mercury concentrations were less than the MCL on all five discharge days; 5) selenium slightly exceeded the MCLs on all five discharge days; 6) chloride concentrations are well below the secondary drinking water

MCL of 250 mg/l; and, 7) sulfate concentrations exceed the secondary standard of 250 mg/l. USMX offers these comparisons with MCLs for reference only.

The results of discharge analyses demonstrate that USMX's treatment efforts were successful in reducing the concentrations of cyanide and mercury to levels below Utah Ground Water Quality Standards and that the mean concentration of arsenic for the total discharge period was also below the Standard. The mean concentration of selenium for the discharge period (0.073 mg/l) was approximately 1.5 times the Standard of 0.05 mg/l. Nitrate levels are elevated as the result of cyanide destruction in the solutions. Similarly, sulfate levels are elevated as the result of the addition of ferric sulfate for arsenic treatment. Again these are end of pipe values and do not represent stream conditions.

#### ASSESSMENT OF IMPACTS TO THE ENVIRONMENT

USMX sampled two data points in East Fork Beaver Dam Wash downstream from the confluence with Arsenic Gulch during the release period. These sites were designated sample points "C" and "D" and are indicative of the lack of effects upon the quality of the downstream flood waters from the release. Sample points "C" and "D" are described as follows:

Sample point C is located approximately 3000 feet downstream from the confluence with Arsenic Gulch at the upstream-most crossing of the East Fork Beaver Dam Wash by the former access road.

Sample point D is located approximately 3.3 miles downstream of the confluence at the downstream-most crossing of the former access road and East Fork Beaver Dam Wash.

In addition, one sample was taken at the mouth of Arsenic Gulch before the solution release began. This sample is designated "AG Wash" and the results of the analysis are summarized in Table A-2. A sample point located on East Fork Beaver Dam Wash approximately 900 feet upstream of the confluence with Arsenic Gulch was also sampled before and during the release. This sample point, designated EFBDW, was selected to provide a control point for comparison with samples taken downstream. The results of these sample analyses are also shown on Table A-2.

The AG Wash sample had a concentration of 0.289 mg/l arsenic before the release of any solutions began. This concentration is six times higher than the mean arsenic concentration for the AG and HB pipe samples during the solution release (Table A-1). Arsenic Gulch has, as its name indicates, eroded through natural arsenic mineralization that is readily visible along the normally dry drainage channel. The elevated concentration of arsenic prior to the release of treated process solutions is apparently the result of this natural arsenic mineralization. Similarly, the AG Wash sample analysis reported elevated concentrations of mercury which, again, are the apparent result of natural mineralization in the Gulch.

The EFBDW sample taken on March 11 was a pre-release sample. Like the AG Wash sample, the pre-release sample from EFBDW contained detectable arsenic, which is apparently natural. No detectable concentrations of cyanide, mercury or selenium were found in any of the EFBDW samples and, with one exception, no arsenic was found in any of the samples.

The results of analysis of water quality samples from sample points C and D on East Fork Beaver Dam Wash are summarized on Tables A-3 and A-4. Again, the free cyanide analyses for these samples were reported by the laboratory to have been affected by matrix interferences. Therefore, the free cyanide values reported by Chemtech are not considered valid. No free cyanide analyses were performed by USMX; however, an alternate technique for determination of free cyanide concentration consists of subtracting the value for WAD cyanide from the value for total cyanide. If this method is used, the mean cyanide concentrations for sample points C and D would be 0.006 mg/l and 0.002 mg/l, respectively.

Relevant Utah water quality standards (R-317-2-14) for aquatic wildlife are summarized below:

arsenic	.190 mg/l (4-day average)
(trivalent)	.360 mg/l (1-hour average)
free cyanide	.0052 mg/l (4-day average)
	.022 mg/l (1-hour average)
mercury	.000012 mg/l (4-day average)
	.0024 mg/l (1-hour average)
selenium	.005 mg/l (4-day average)
	.02 mg/l (1-hour average)
pH	6.5 - 9.0

Comparison of these standards with the values for these analytes reported for sample points C and D demonstrate that even in the ephemeral reach of East Fork of Beaver Dam Wash sampled, the water quality standards were not exceeded for arsenic, mercury, selenium, and pH.

The mean free cyanide concentrations for samples taken at sample points C and D for the recent release were 0.006 mg/l and 0.002 mg/l. These concentrations are not expected to have caused an exceedence of the Utah Water Quality Standard for free cyanide in downstream perennial reaches.

No aquatic wildlife standard exists for nitrate; however, the measured concentrations at sample points C and D (Tables A-3 and A-4) were below the standard for domestic use (the only use for which a standard exists) of 10 mg/l.

The foregoing demonstrate that there was no exceedence of Utah Water Quality Standards, and therefore no adverse impact to water quality, in the reaches of East Fork Beaver Dam Wash that were sampled. As a result, the perennial reaches of this stream located further downstream, which are reported to represent aquatic habitat, would also not have been adversely affected by the release.

USMX believes that its actions during and leading up to the recent release of treated process solution were prudent, timely, and in the best interest to the environment. USMX reiterates its belief that its actions, taken in response to extraordinary precipitation events that occurred over the previous winter season, were prudent and that best available technology was used in all aspects of solution treatment, storage, and release.

TABLE A-1

**USMX of Utah, Inc. - Goldstrike Mine**  
Pipe Discharge Samples (HB Pipe and AG Pipe)

PARAMETERS	HB Pipe 03/12/95	HB Pipe 3/13/95	AG Pipe 3/11/95	AG Pipe 3/12/95	AG Pipe 3/13/95	AG Pipe 3/14/95	AG Pipe 3/15/95	Mean	MCL
Cyanide as CN (T), mg/l	N/A	N/A	0.370	0.900	0.472	0.893	0.882	0.7	None
Cyanide as CN (Free), mg/l	N/A	N/A	0.200	0.510	<.01	0.778	0.637	0.427	0.200
WAD Cyanide as CN, mg/l	N/A	N/A	0.270	<.016	0.025	0.504	0.525	0.268	None
Chloride as Cl, mg/l	N/A	N/A	95.000	98.000	122.000	110.000	113.000	108	250**
Nitrate as NO <sub>3</sub> -N, mg/l	N/A	N/A	66.200	102.000	111.000	111.000	116.000	101	10.000
Sulfate as SO <sub>4</sub> , mg/l	N/A	N/A	1290.000	1480.000	1520.000	1570.000	1660.000	1504	
pH Units	N/A	N/A	7.660	7.510	7.470	9.600	9.480	8.3	6.5-8.5
Arsenic as As, mg/l	0.034	0.034	0.027	0.076	0.048	0.044	0.066	0.47	0.050
Mercury as Hg, mg/l	0.002	0.002	<.0002	0.002	0.001	0.001	0.002	0.0013	0.002
Selenium as Se, mg/l	0.065	0.074	0.078	0.077	0.089	0.062	0.067	0.073	0.050

Possible matrix interference =  

\*\* = Secondary Standard

TABLE A-2

**USMX of Utah, Inc. - Goldstrike Mine**  
Pre-Release/Upstream Samples (EFBDW and Ag Wash)

PARAMETERS	AG Wash 03/11/95	EFBDW 03/11/95	EFBDW 03/13/95	EFBDW 03/14/95	EFBDW 03/15/95	EFBDW 03/16/95	Mean	MCL
Cyanide as CN (T), mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	None
Cyanide as CN (Free), mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.200
WAD Cyanide as CN, mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	None
Chloride as Cl, mg/l	<1	<1	9.000	10.000	11.000	12.000	11.000	250**
Nitrate as NO <sub>3</sub> -N, mg/l	0.169	0.067	0.072	0.056	0.052	0.207	0.098	10.000
Sulfate as SO <sub>4</sub> , mg/l	15.000	6.400	13.000	14.000	15.000	17.000	15.000	
pH Units	7.770	7.560	7.960	8.300	8.290	8.660	8.300	6.5-8.5
Arsenic as As, mg/l	0.289	0.016	<.01	<.01	0.011	<.01	<.01	0.050
Mercury as Hg, mg/l	0.001	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	0.002
Selenium as Se, mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.050

\*\* = Secondary Standard

TABLE A-3

**USMX of Utah, Inc. - Goldstrike Mine**  
Downstream of Discharge ('C')

PARAMETERS	'C' 03/11/95 12:45	'C' 03/11/95 6:25 P.M.	'C' 03/12/95	'C' 03/13/95	'C' 03/14/95	'C' 03/15/95	'C' 03/16/95	Mean	MCL
Cyanide as CN (T), mg/l	<.01	<.01	0.022	0.026	0.026	0.028	<.01	0.019	None
Cyanide as CN (Free), mg/l	<.01	<.01	0.020	0.028	0.044	0.054	<.01	0.024	0.200
WAD Cyanide as CN, mg/l	<.016	<.016	0.011	<.01	0.019	0.022	<.01	0.013	None
Chloride as Cl, mg/l	4.000	<1	8.000	13.000	15.000	16.000	11.000	10.000	
Nitrate as NO3-N, mg/l	0.320	0.522	2.080	5.910	3.690	4.810	0.104	5.481	10.000
Sulfate as SO4, mg/l	11.000	14.000	42.000	74.000	66.000	87.000	19.000	45.000	
pH Units	7.940	7.900	8.150	7.910	8.290	8.320	8.650	8.200	6.5-8.5
Arsenic as As, mg/l	0.097	0.049	<.01	<.01	<.01	<.01	<.01	0.028	0.050
Mercury as Hg, mg/l	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	0.002
Selenium as Se, mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.050

Possible matrix interference = 

TABLE A-4

**USMX of Utah, Inc. - Goldstrike Mine**  
Downstream of Discharge ('D')

PARAMETERS	'D' 03/11/95	'D' 03/12/95	'D' 03/13/95	'D' 03/14/95	'D' 03/15/95	'D' 03/16/95	Mean	MCL
Cyanide as CN (T), mg/l	<.01	<.01	0.022	0.027	0.019	0.010	0.014	None
Cyanide as CN (Free), mg/l	<.01	<.01	0.027	0.051	0.036	0.010	0.010	0.200
WAD Cyanide as CN, mg/l	<.016	<.01	<.01	0.024	0.017	<.005	0.012	None
Chloride as Cl, mg/l	<1	8.000	14.000	14.000	15.000	14.000	11.000	
Nitrate as NO3-N, mg/l	0.249	1.760	0.122	3.040	4.520	0.147	1.640	10.000
Sulfate as SO4, mg/l	14.000	40.000	68.000	71.000	78.000	37.000	5.100	
pH Units	7.750	8.190	8.180	8.350	8.340	8.640	8.240	6.5-8.5
Arsenic as As, mg/l	0.241	<.01	0.014	<.01	<.01	<.01	0.050	0.050
Mercury as Hg, mg/l	0.001	<.0002	<.0002	<.0002	<.0002	<.0002	0.0003	0.002
Selenium as Se, mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.050

Possible matrix interference =